

6.2 Conservation Element

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6.2 Conservation Element

6.2.1 Introduction

The conservation element is based upon the premise that the existing natural environment possesses its own inherent values and qualities that should be preserved. In the context of local planning, conservation is a positive action to assure that as build-out of the community continues to occur as envisioned by the Surprise General Plan 2030, related physiographic, hydrological, biological, and cultural resources are not lost or permanently altered to the detriment of the natural environment that we all share and enjoy. Correspondingly the role of the conservation element is to help identify these limitations and opportunities and define various policies and implementation measures by which these natural resources can be conserved within the Surprise Planning Area. Surprise's environmental heritage includes non-renewable resources such as extensive undisturbed natural areas, scattered historic/archaeological sites, and natural landmarks. As irreplaceable resources they warrant preservation from destruction or harmful alteration.

6.2.2 Discussion

A. Natural and Biological Resources

Surprise is a part of the Sonoran Desert, one of the four deserts within the North American regions. The Sonoran Desert is lush in comparison to most other deserts. Two visually dominant life forms of plants distinguish the Sonoran Desert from other North American deserts: legume trees and columnar cacti. Much of the Sonoran Desert area has a bi-seasonal rainfall pattern and mild winters. In general the region is characterized by high average temperatures, low humidity, and other extreme temporal and spatial variability in precipitation amounts. The significance of ecologically rich and diverse plant and wildlife communities, the area's precious water and air resources, and productive open air resources contribute greatly to the city's quality of life.

Scenic Resources

Surprise's location near the White Tank Mountains and the Hieroglyphic Mountains provides residents and visitors with an



abundance of scenic vistas, and broad expanses of desert land contrasted with distant peaks (MAP 2.6B). Residents of Surprise are well acquainted with these qualities and the existence of such magnificent scenery is an important factor in sustaining a great quality of life. Continued human activity leaves its mark on the landscape, with both positive and negative results to the viewshed. Careful, well designed and sensitive development of slope areas, through techniques such as cluster development near open features and trails, may mitigate negative impacts on the viewshed.



Wash Environs

The environmental characteristic of Surprise is due in large measure to the major washes like Trilby that traverse through this area (MAP 6.2B). These wash environs are characterized by limited amounts of water and by the presence of arborescent, often spiny shrubs. Flash floods keep the central channel clear of vegetation but along the wash's edge grow thickets of vegetation that are generally taller and denser than those of the surrounding desert habitats. The dense shrubbery also provides food and cover for other wildlife forms. Wash environs are the Sonoran Desert's most precious asset, vital to the movement and survival of all wildlife species, linking habitat corridors and a major part of the Agua Fria and Salt River watershed. Neotropical birds use these on the north south journeys, deer, bobcats, and javelina find water to drink and dozens of endangered fish species inhabit permanent pools. Natural landmarks such as these are valued for scenic, visual and aesthetic values, providing a record of the natural heritage of Surprise.



Flora & Fauna

Arid western landscapes provide a habitat for a variety of plant and animal species that are specially adapted for survival in areas with saline conditions and ephemeral water sources. The abundant cacti and other succulents defy the harsh climate with exuberant biodiversity. A brief description of the Surprise Planning Area's common vegetation communities are provided below, followed by an identification of sensitive species and habitats that warrant additional



protection and management strategies to preserve their features.

Vegetation types within the planning area maybe generally classified into three categories:

1. Urban – Includes ornamental landscaping, non native grass and weed associations in vacant lots, and scattered agricultural crop and orchard plantings
2. Rural Agricultural – Includes row crops, orchards and ruderal vegetation. Agricultural products grown in the planning area include cotton, corn, and squash.
3. Desert Shrub - Columnar cacti and legume trees and succulents make up most of the vegetation within the Surprise Planning Area.



Sensitive or special status species are those animal species that are designated by federal or state regulatory agencies as needing protection due to rarity or threats to their existence. Sensitive habitats are those areas in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in the ecosystem. The plant and animal species described in Table 6.2A include special status species that have moderate to known occurrence within the Surprise Planning Area.

It is a miracle that life can survive and thrive in the extreme conditions of the desert. Common animals found in the general environment include many species of invertebrates, birds and vertebrate species including fish, reptiles and amphibians, mammals, and birds like roadrunners and quail. Types of animals that are generally found in this region based on their adaptive characteristic are:

- Escaping animals – Animals that enter lands only when moisture is available.
- Evading animals – Burrowing animals with night activity that do not need to provide water for temperature regulation.



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- Resisting animals – Animals that endure dehydration and still remain active through physiological processes by which they are able to conserve water.
- Enduring – Animals that estivate during hot dry periods such as ground squirrels and gophers.

Table 6.2A

Name	Common Name	Status ¹				Quad	Town Range
		ESA	USFS	BLM	STATE		
<i>Athene cunicularia hypugaea</i>	Western Burrowing Owl	SC		S		McMicken Dam	030N020W
Bat Colony						White Tank Mountains NE	030N030W
<i>Cicindela oregona maricopa</i>	Maricopa Tiger Beetle	SC	S	S		Wickenburg	060N040W
<i>Eumeces gilberti arizonensis</i>	Arizona Skink	SC	S		WSC	Wickenburg	070N040W
<i>Gopherus agassizii</i> (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC	Wickenburg SW	060N040W
<i>Gopherus agassizii</i> (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC	Red Picacho	070N030W
<i>Gopherus agassizii</i> (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC	Garfias Mountain	070N020W
<i>Macrotus californicus</i>	California Leaf-nosed Bat	SC			WSC	White Tank Mountains NE	030N030W
<i>Myotis velifer</i>	Cave Myotis	SC		S		Wickenburg SW	060N040W

There were no listed or endangered plants, or critical habitats documented within the Surprise general Planning Area. Source: AZ Dept. of Game and Fish, Heritage Data management System, January 10, 2008.

^[1] **Federal and US Status Terms**

ESA **Endangered Species Act** (1973 as amended)
US Department of Interior, Fish and Wildlife Service
(<http://www.fws.gov/southwest/es/arizona>)

Listed

- LE** Listed Endangered: imminent jeopardy of extinction.
- LT** Listed Threatened: imminent jeopardy of becoming Endangered.
- PS** Partial Status: listed Endangered or Threatened, but not in entire range.
- XN** Experimental Nonessential population.
- PDL** Proposed for delisting.

Proposed for Listing

- PE** Proposed Endangered.
- PT** Proposed Threatened.

Candidate (Notice of Review: 1999)

- C** Candidate. Species for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as Endangered or Threatened under ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.
- SC** Species of Concern. The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (currently all former C2 species).
- DPS** Distinct Population Segment: a portion of a species' or subspecies' population or range. The DPS is generally described geographically.

Critical Habitat (check with state or regional USFWS office for location details)

- Y** Yes: Critical Habitat has been designated.
- P** Proposed: Critical Habitat has been proposed.

[\N No Status: certain populations of this taxon do not have designated status (check with state or regional USFWS office for details about which populations have designated status)].

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USFS US Forest Service (1999 Animals, 1999 Plants: corrected 2000)
US Department of Agriculture, Forest Service, Region 3
(<http://www.fs.fed.us/r3/>)

S Sensitive: those taxa occurring on National Forests in Arizona which are considered sensitive by the Regional Forester.

BLM US Bureau of Land Management (2005 Animals, 2005 Plants)
US Department of Interior, Bureau of Land Management, Arizona State Office
(<http://azwww.az.blm.gov>)

S Sensitive: those taxa occurring on BLM Field Office Lands in Arizona which are considered sensitive by the Arizona State Office.

P Population: only those populations of Banded Gila monster (*Heloderma suspectum cinctum*) that occur north and west of the Colorado River, are considered sensitive by the Arizona State Office.

Table 6.2A (continued)

The City recognizes the need to contribute to the protection of native plants and animals, and their habitats before their populations are so low that they must be listed as threatened or endangered under the State and Federal Endangered species acts and will provide protection to special status species.

B. Geological Resources

The city of Surprise is located within the Salt River Valley, exhibiting very little topographical change in the range of 0-2 percent slope (Map 6.2A). A two percent slope indicates that for every 100 feet horizontal distance, the land rises or drops two feet. The existing slope drains to the southeast. A slope of two percent allows virtually unrestricted development for agricultural, rural, or urban land uses.

Geologically Surprise lies within the Basin and Range province (Fig 6.2A). Tectonic stretching of the North American continental crust during the last 25 million years has yielded a broad rift called the Basin and Range province, so named because topographically, it consists of long linear mountain ranges separated from one another by flat plains (basins) of alluvium. The range in the general area of Surprise contains Proterozoic metamorphic, and igneous rocks and the aquifers here are formed of volcanic and carbonate rocks and unconsolidated to consolidated basin-fill deposits. The basin fill deposits form the most productive aquifers and are generally in individual alluvial basins that are drained internally and separated by low mountains. The geology of the area plays

a large role in the soils, drainage patterns, and other physiographic features of the region.

Surprise itself is located on top of an alluvial valley and connected to the Salt River Valley to the east. The alluvium is composed of three quaternary sedimentary deposits that are nearly 1,200 feet deep and contain significant deposits of gypsum and calcite. The upper alluvial unit is composed of relatively coarse grained unconsolidated materials and extends to a depth of 800 feet. The middle fine grain unit is composed of finer grained material that extends to a depth of 1,050 feet. The lower conglomerate unit contains mostly consolidated, relatively coarse grained deposits. The characteristics of these strata create a very solid building foundation as well as holding and purifying the underground water aquifer.

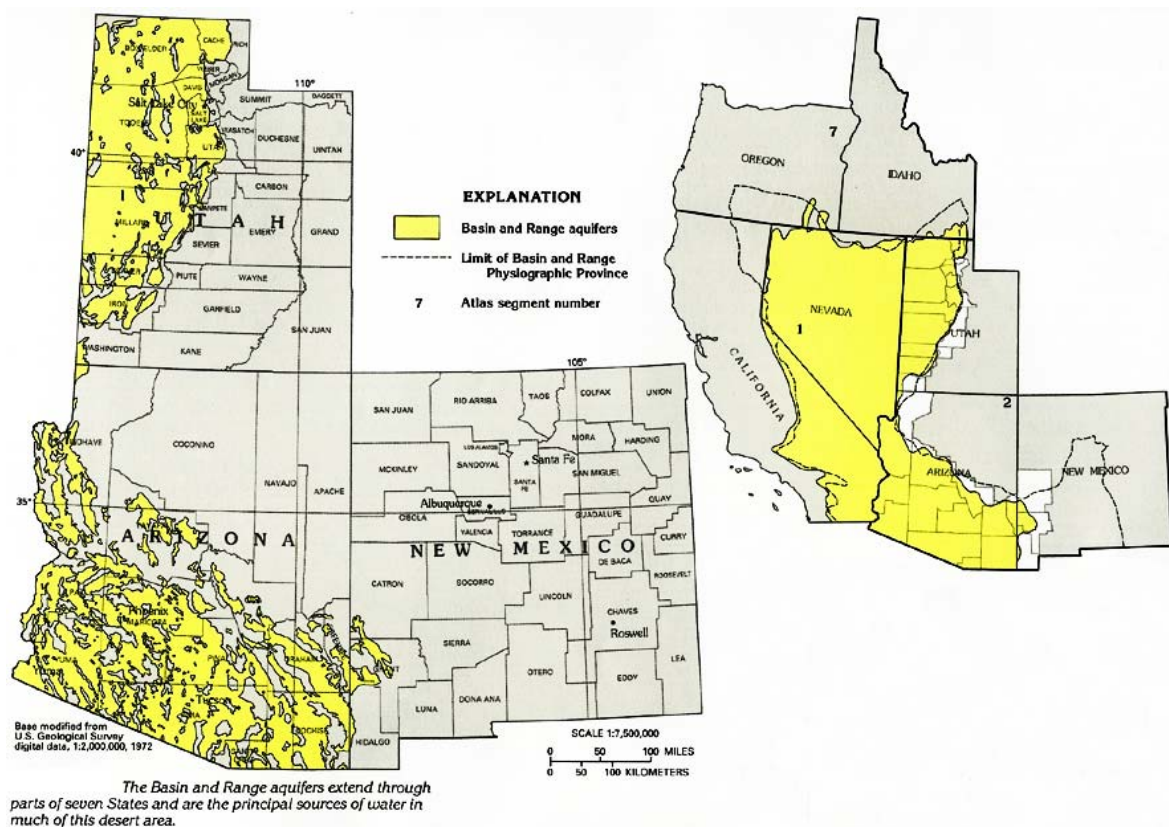


Figure 6.2A - Source: Basin and Range Aquifer, Ground Water Atlas of the United States, USGS, 1995 accessed at http://capp.water.usgs.gov/gwa/ch_b/B-text2.html

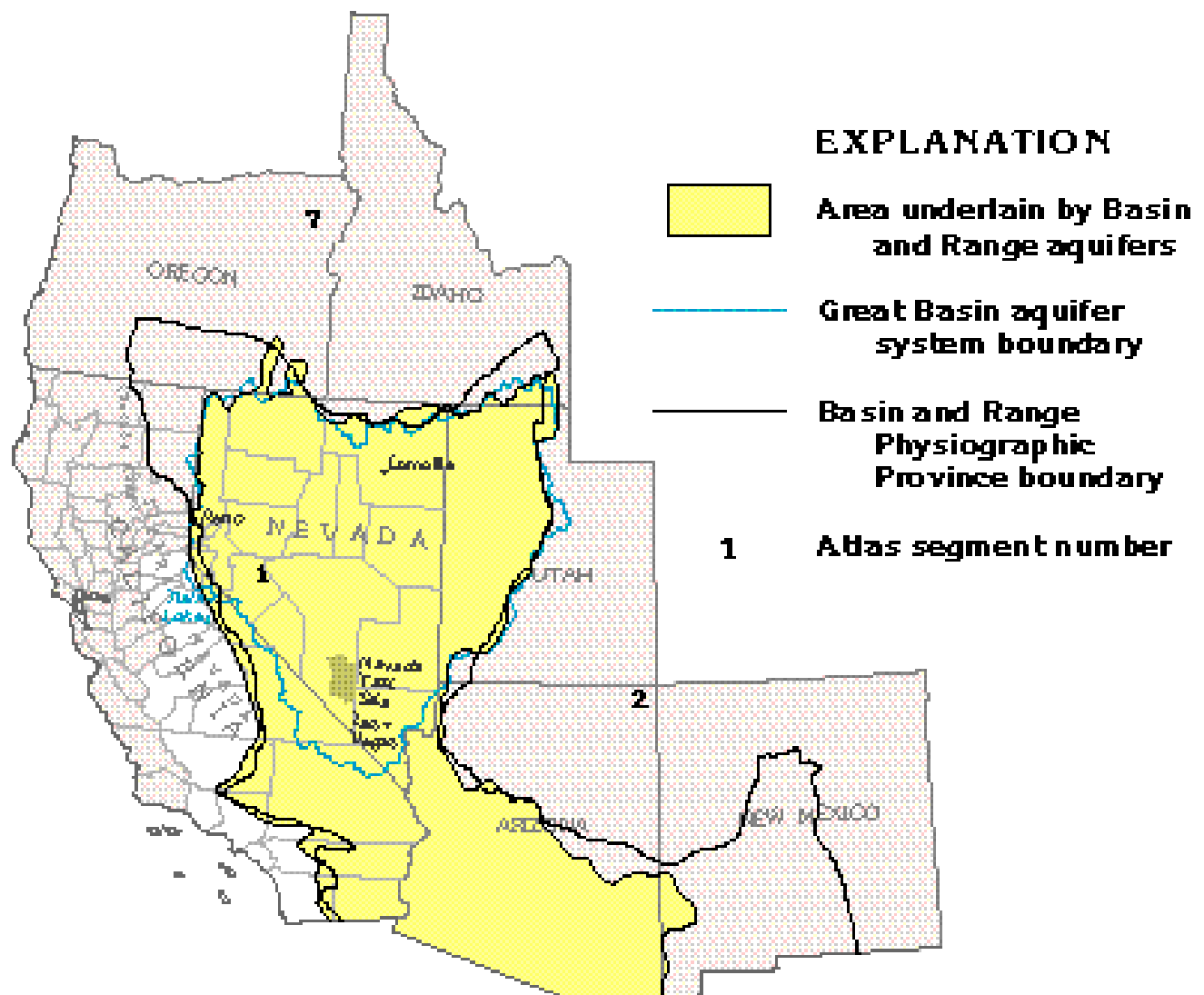


Figure 6.2B - Source: *Basin and Range Aquifer, Ground Water Atlas of the United States*, USGS, 1995 accessed at http://capp.water.usgs.gov/gwa/ch_b/B-text2.html

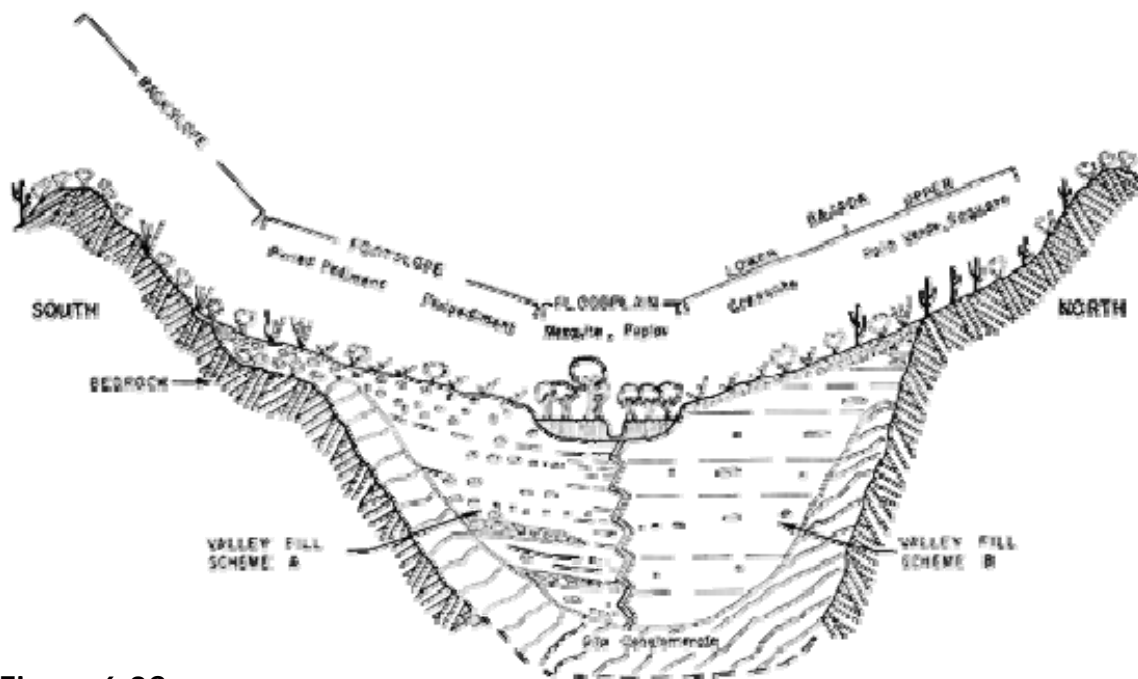


Figure 6.2C

Figure 1 Diagrammatic profile of a valley in the Basin-Range province. This illustrates the conventional concept of valley fill with coarse material adjacent to mountains grading into fine alluvium and lake sediments near the middle of the valley.

Due in part to the characteristics of the sedimentary strata underlying Surprise, the region is geologically inactive with respect to faults. A seismic risk map places Maricopa County in Zone 2, which can receive moderate earthquake damage, although no record currently exists. The closest linear earth fissures, which act as drains for overland waterflow have been identified in Section 25, Township 3 North, Range 3 West, which is located to the south of the Surprise Planning Area.

One of the major geologic features in the general area is the White Tank Mountains. The White Tank Mountains form one of the several metamorphic core complexes in central Arizona. Two major types of rocks are found in the mountain range; 1.7-1.6 billion years old Proterozoic metamorphic rocks and a Tertiary or Cretaceous age granitic intrusion.

C. Soils

Soil morphology in the general region has been greatly affected by the geology of the area. The ranges drain into the adjacent basins and the sediments transported are usually much finer sands, silts and clays. Soils found in the Surprise area vary slightly in texture; most are loamy or loamy-sandy and gravelly, while others contain layers of

sticky clay, or even rock-hard, white limy layers. Most of the soils found in the area are generally suitable for building and agriculture with the main risk associated being erosion. The composition of the soils also makes it low risk for shrink-swell potential. The majority of soils found in the Surprise Planning Area were formed from old alluvium eroded from the White Tank Mountain Range. Although the soil types found in the Surprise Planning Area are generally very similar, each exhibits differing characteristics when utilized for development. The Surprise Planning Area exhibits 23 different types of soils which are categorized as loams, sands, or clays and are listed in the Table 6.2B.

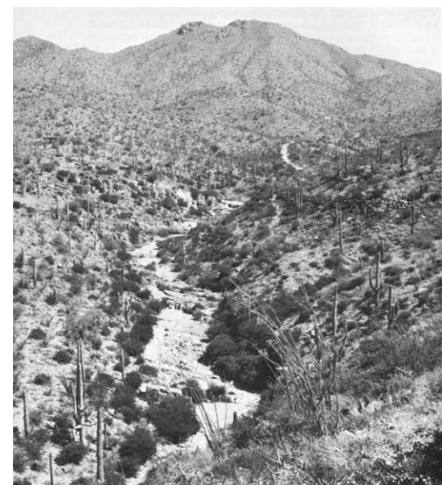
Table 6.2B

Symbol	Series	Texture
Aa	Agualt	Loam Sand
Aba	Antho	Sandy Loam Gravelly Sandy Loam
Bs	Brios	Sandy Loam Sand and Gravelly sand
Cd	Carrizo	Gravelly Sandy Loam Very gravelly Coarse Sand
Es	Estrella	Loam Clay Loam
GgA	Gilman	Loam Very Fine Sandy Loam
Gt	Glenbar	Clay Loam Silty Clay Loam
GxA	Gunsight	Gravelly Loam Very gravelly Loam
LcA, Le	Laveen	Loam
Ma	Maripo	Sandy Loam Gravelly Loam
Mo, Mp, Mr	Mohall	Sandy Loam Gravelly Sand
PeA	Perryville	Gravelly Loam
RbA	Rillito	Gravelly Loam Gravelly Sandy Loam
Te, Tfa, TrB	Tremant	Gravelly Clay Loam Gravelly Loam
Tu	Tucson	Loam Clay Loam
Ve, Vf	Vecont	Clay
Vh	Vint	Loamy Fine Sand

D. Subsidence & Fissures

The sediment filled basins in the area hold large quantities of groundwater in storage and large amounts of withdrawal of groundwater has led to subsidence in many parts of central and western Arizona. Land subsidence is the vertical displacement of the ground surface, where the subsurface consists of compressible silt and clay. The damaging effect of subsidence can include gradient changes in transportation, utility, and flood control facilities. Settlement on the other hand is the gradual downward movement of an engineered structure due to the compaction of the unconsolidated material below the foundation. Because of the gradual, long term nature of subsidence and settlement these phenomena do not pose a life safety hazard but do result in property losses. The effects of subsidence can create decreased groundwater storage capacity, change slope patterns (affecting irrigation, flood control, and drainage patterns), and cause damage to both surface and underground structures.

The impact of land subsidence varies throughout the Surprise Planning Area, but the majority of land has dropped from one to three feet in the last 30 years (MAP 6.2C). The land located adjacent to the Beardsley canal has been documented to have subsided less than one foot near the intersection of US-60, but increases to nearly three feet as the canal parallels the White Tank Mountains. The only occurrence of subsidence and fissures that has been documented in the area lies to the south of the Surprise Planning Area near Luke AFB.



E. Drainage Patterns

Surprise lies largely within the West Salt River Valley sub-basin and in a small portion of the Hassayampa basin. The basins in Arizona are mostly made of unconsolidated basin-filled deposits and consolidated sedimentary. These deposits are sands, silts and gravel which are very permeable. The aquifers here can range in depth from 20 feet near the

mountains to 150 feet in the center of the basins. Typically the aquifers in Central Arizona yield considerable groundwater. In the West Salt River Valley sub-basin, groundwater enters as underflow from the Lake Pleasant sub-basin, the northern part of the Hassayampa sub-basin and the Maricopa-Stanfield sub-basin in Pinal County.

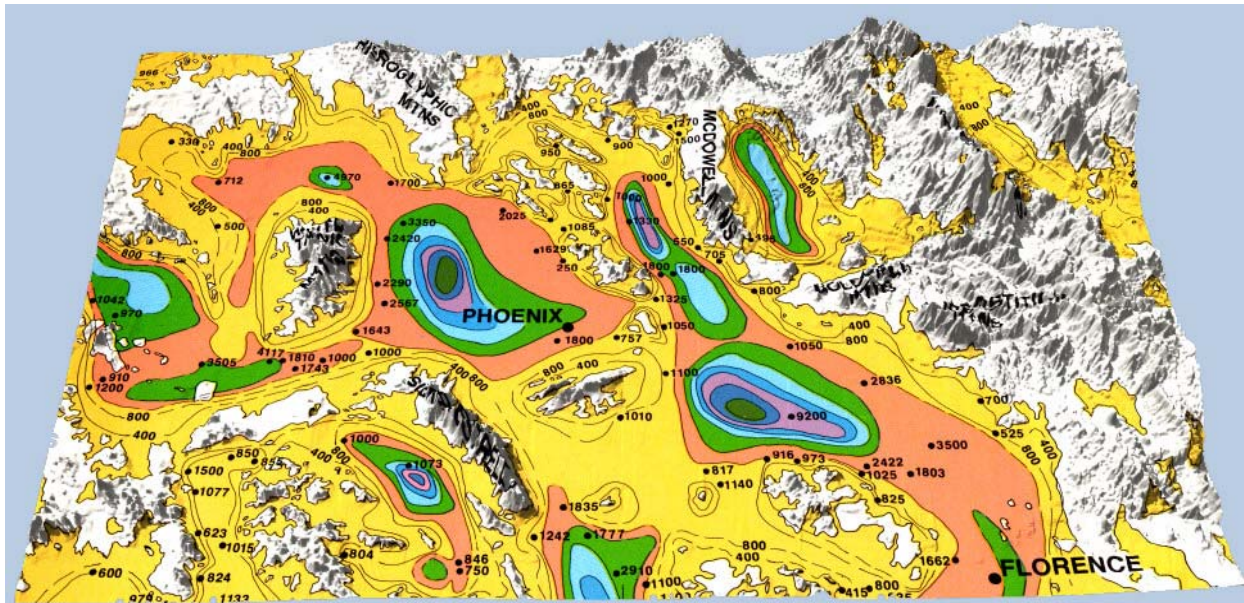


Figure 6.2D Depth to bedrock (in feet) draped over topography. The bulls-eyes are deep basins. Oppenheimer and Sumner (1980)

6.2.3 Goals and Policies

Goal 1

Biological and natural resources within the Surprise Planning Area are enhanced and protected.



Policies:

1. Protect and enhance the wash corridors and environs through a comprehensive management strategy.
2. Discourage mass grading of large parcels to prevent environmental damage.
3. Encourage the retention of washes with 100-year flows of 250 cfs and greater in their undisturbed condition.
4. Encourage new flood control projects to consider storm water recharge designs alternatives to channelization and to impermeable bank protection.
5. Preserve wildlife ecosystems and sensitive habitat areas.
6. Protect special status species and supporting habitats within Surprise, including species that are state or federally listed as endangered, threatened, or rare.

Goal 2


Natural scenic qualities within the city of Surprise are maintained.



Policies:

1. Encourage nighttime lighting to be kept at a minimum to maintain dark skies.
2. Encourage the preservation of the scenic quality and vistas of all mountain ranges in the city.
3. Designate scenic routes and discourage development patterns that reduce scenic qualities.
4. Discourage industrial and commercial uses on slopes greater than 10 per cent and residential uses on slopes over 15 per cent unless the natural form of the hillside setting is reflected and visual and environmental impacts are minimized through appropriate planning and architectural design techniques.

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5. Require establishment of development and design standards to ensure retention of ridgelines and prominent hillsides.

Goal 3

Risks of property damage and personal injury posed by geologic hazards are minimized.



Policies:

1. Require geotechnical studies prior to development approval in geologic hazard areas.
2. Ensure that new development on hillsides is constructed to reduce erosion and other hazards.
3. Ensure vegetation of cut and fill slopes to control erosion.